IN THE CLAIMS

Claim 1 (original): A class AB output circuit having an input terminal and an output terminal, comprising:

(a) a P-channel first output transistor having a source coupled to a first supply voltage, a drain coupled to the output terminal, and a gate coupled to respond to an input signal on the input terminal, and an N-channel second output transistor having a drain coupled to the output terminal, a source coupled to a second supply voltage, and a gate coupled to respond to the input signal;

(b) a first N-channel transistor having a drain coupled to a gate of the first output transistor and also coupled to the first supply voltage by means of a first current source and a source coupled to the second supply voltage by means of a second current source;

(c) a first diode-connected N-channel transistor, a second diode-connected N-channel transistor, and a first voltage level shifting circuit coupled in series between the second supply voltage and a gate of the first N-channel transistor, and a current source coupled between the first supply voltage and the gate of the first N-channel transistor; and

(d) a second voltage level shifting circuit coupled between the gate of the second output transistor and the source of the first N-channel transistor.

Claim 2 (currently amended): The class AB output circuit of claim 1 wherein the first voltage level shifting circuit has a first terminal coupled to a gate and drain of the first diode-connected N-channel transistor and a second terminal coupled to a source of the second diode-connected N-channel transistor, a gate and drain of the second diode-connected N-channel transistor being coupled to the gate of the first N-channel transistor, a source of the first diode-connected N-channel transistor being coupled to the second supply voltage ~~conductor~~.

Claim 3 (original): The class AB output stage of claim 2 wherein the first terminal of the first voltage level shifting circuit is connected directly to the gate and drain of the first diode-connected N-channel transistor.

Claim 4 (currently amended): The class AB output stage of claim ~~3~~ 2 wherein the first terminal of the first voltage level shifting circuit is indirectly coupled to the gate and drain of the first diode-connected N-channel transistor by means of an operational amplifier having a first input connected to the gate and drain of the first diode-connected N-channel transistor and a second input connected to the first terminal of the first voltage level shifting circuit and an output coupled to provide feedback control of the voltage of the second terminal of the first voltage level shifting circuit.

Claim 5 (original): The class AB output circuit of claim 2 wherein the first supply voltage is positive relative to the second supply voltage, and wherein the first and second terminals of the first voltage level shifting circuit are (+) and (-) terminals, respectively, and wherein a (+) terminal of the second voltage level shifting circuit is coupled to the gate of the second output transistor and a (-) terminal of the second voltage shifting circuit is coupled to the source of the first N-channel transistor.

Claim 6 (original): The class AB output circuit of claim 1 wherein the input signal is coupled directly to the gate of the second output transistor.

Claim 7 (original): The class AB output circuit of claim 1 wherein the input signal is coupled indirectly to the gate of the second output transistor.

Claim 8 (original): A class AB output circuit having an input terminal and an output terminal, comprising:

(a) a P-channel first output transistor having a source coupled to a first supply voltage and a drain coupled to the output terminal, and an N-channel second output transistor having a drain coupled to the output terminal and a source coupled to a second supply voltage;

(b) a first P-channel transistor having a source coupled to the output terminal and a gate coupled to the input terminal;

(c) a first N-channel transistor having a drain coupled to a gate of the first output transistor and also coupled to the first supply voltage by means of a first resistor and a source coupled to the second supply voltage by means of a second current source;

(d) a first diode-connected N-channel transistor having a source connected to the second supply voltage;

(e) a first voltage level shifting circuit having a (+) terminal coupled to a gate and drain of the first diode-connected N-channel transistor;

(f) a second diode-connected N-channel transistor having a source connected to a (-) terminal of the first voltage level shifting circuit; and

(g) a second voltage shifting circuit having a (-) terminal coupled to the gate of the second output transistor and a drain of the first P-channel transistor and a (+) terminal coupled to the source of the first N-channel transistor.

Claim 9 (original): The class AB output circuit of claim 8 wherein the first voltage level shifting circuit includes an operational amplifier having a (-) input coupled to the gate and drain of the first diode-connected N-channel transistor and a (+) input coupled to the source of the second diode-connected N-channel transistor.

Claim 10 (original): The class AB output circuit of claim 9 wherein the (+) input of the operational amplifier is coupled to the source of the second diode-connected N-channel transistor by means of a first level shifting resistor having a first terminal coupled to the (+) input of the operational amplifier and a second terminal coupled to the source of the second diode-connected N-channel transistor.

Claim 11 (original): The class AB output circuit of claim 10 wherein the second voltage level shifting circuit includes a second resistor having a first terminal coupled to the gate of the second output transistor and a second terminal coupled to the source of the first N-channel transistor.

Claim 12 (original): The class AB output circuit of claim 11 including a second N-channel transistor having a source coupled to the second supply voltage, a drain coupled to the second terminal of the first voltage level shifting resistor, and a gate coupled to an output of the operational amplifier.

Claim 13 (original): The class AB output circuit of claim 12 including a third N-channel transistor having a source coupled to the second supply voltage, a drain coupled to the second terminal of the second voltage level shifting resistor, and a gate coupled to an output of the operational amplifier.

Claim 14 (original): The class AB output circuit of claim 11 wherein the resistance of the second resistor tracks the resistance of the first resistor with respect to temperature.

Claim 15 (original): The class AB output circuit of claim 13 wherein the output of the operational amplifier performs the function of setting the voltage of the first terminal of the first resistor to be equal to the voltage of the gate and drain of the first diode-connected transistor.

Claim 16 (original): A method of operating a class AB output circuit at reduced power supply voltage levels, the class AB output circuit including

an input terminal and an output terminal,

a P-channel first output transistor having a source coupled to a first supply voltage, a drain coupled to the output terminal, and a gate coupled to respond to an input signal on the input terminal, and an N-channel second output transistor having a drain coupled to the output terminal, a source coupled to a second supply voltage, and a gate coupled to respond to the input signal, a first N-channel transistor having a drain coupled to a gate of the first output transistor and also coupled to the first supply voltage by means of a first current source and a source coupled to the second supply voltage by means of a second current source,

a first diode-connected N-channel transistor and a second diode-connected N-channel transistor coupled in a series relationship between the second supply voltage and a gate of the first N-channel transistor, and a current source coupled between the first supply voltage and the gate of the first N-channel transistor, the method comprising:

(a) shifting a first voltage level on the gate and drain of the first diode-connected N-channel transistor by a first predetermined amount to a first lower level and applying the first lower level to the source of the second diode-connected N-channel transistor; and

(b) shifting a second voltage level on the gate of the second output transistor by a second predetermined amount to a second lower level and applying the second lower level to the source of the first N-channel transistor.

Claim 17 (original): A class AB output circuit for operation at reduced power supply voltage levels, comprising:

an input terminal and an output terminal,

a P-channel first output transistor having a source coupled to a first supply voltage, a drain coupled to the output terminal, and a gate coupled to respond to an input signal on the input terminal, and an N-channel second output transistor having a drain coupled to the output terminal, a source coupled to a second supply voltage, and a gate coupled to respond to the input signal, a first N-channel transistor having a drain coupled to a gate of the first output transistor and also coupled to the first supply voltage by means of a first current source and a source coupled to the second supply voltage by means of a second current source;

a first diode-connected N-channel transistor and a second diode-connected N-channel transistor coupled in a series relationship between the second supply voltage and a gate of the first N-channel transistor, and a current source coupled between the first supply voltage and the gate of the first N-channel transistor;

means for shifting a first voltage level on the gate and drain of the first diode-connected N-channel transistor by a first predetermined amount to a first lower level and applying the first lower level to the source of the second diode-connected N-channel transistor; and

means for shifting a second voltage level on the gate of the second output transistor by a second predetermined amount to a second lower level and applying the second lower level to the source of the first N-channel transistor.

Claim 18 (original): A voltage reference circuit comprising:

(a) a class AB output circuit including

i. a P-channel first output transistor having a source coupled to a first supply voltage, a drain coupled to the output terminal, and a gate coupled to respond to an input signal on the input terminal, and an N-channel second output transistor having a drain coupled to the output terminal, a source coupled to a second supply voltage, and a gate coupled to respond to the input signal,

ii. a first N-channel transistor having a drain coupled to a gate of the first output transistor and also coupled to the first supply voltage by means of a first current source and a source coupled to the second supply voltage by means of a second current source,

iii. a first diode-connected N-channel transistor, a second diode-connected N-channel transistor, and a first voltage level shifting circuit coupled in series between the second supply voltage and a gate of the first N-channel transistor, and a current source coupled between the first supply voltage and the gate of the first N-channel transistor, and

iv. a second voltage level shifting circuit coupled between the gate of the second output transistor and the source of the first N-channel transistor;

(b) a bandgap reference voltage circuit; and

(c) a feedback amplifier including a first input coupled to an output of the bandgap reference voltage circuit, a second input coupled to receive a feedback signal produced in response to an output voltage on the output terminal, and an output coupled to produce the input signal on the input terminal.

Claim 19 (original): The reference circuit of claim 18 including a feedback circuit including a first feedback resistor and a second feedback resistor coupled in series between the output terminal and the second supply voltage, the feedback signal being produced at a junction between the first and second feedback resistors.